Data Table: Various gases are filled into a syringe and massed.   Each gas sample has the same volume.

Mass of syringe (plunger all the way in) = __77.574 g____   mass of syringe + vacuum = __77.418 g_____

	AIR	**CH₄**	**O₂**	**CO₂**
mass of syringe + gas	77.576 g	77.516 g	77.590 g	77.655 g
mass of sample of gas (g) (all have same volume)	77.576 g – 77.418 g = 0.158 g	0.098 g	0.171	0.237 g
relative mass of gas compared to CO₂	0.158 g / 0.237 g = 0.667	0.41	0.726	1.00 = 1.00
experimental molecular mass of gas (CO₂ is set to a mass of 44.0 because this makes mass of H = 1.0 amu)	0.667 × 44.0 amu = 29.3 amu	18 amu	31.9 amu	44.0 amu
accepted molecular mass of gases	* 29.0 amu	16.0 amu	32.0 amu	44.0 amu
% error	$\dfrac{\|29.3-28.9\|\ \text{amu}}{28.9\ \text{amu}}\times100$ =1%	13%	0.3%	—

Post Demo Questions:

1) *To find accepted molecular mass of air:
   "Air" is of course, NOT on the periodic table. It is actually a mixture of N₂ gas, O₂ gas and some Ar gas.
   Using the percent composition of air given below, find the accepted molecular mass of air.
             Air is 78.1 % N₂,   20.9 % O₂ and   0.934 % Ar.
   $(0.781)(28.0\ \text{amu})+(0.209)(32.0\ \text{amu})+(0.00934)(40.0\ \text{amu})=28.9\ \text{amu}$

2) In the lab, we assumed that the gas from the gas jets was pure methane gas (CH₄). However, in reality there is some ethane gas (CH₃CH₃) mixed in. Does this fact help to explain your experimental error in your mass of CH₄? Explain.
   Since ethane has more atoms, it should have more mass (30 vs. 16) and the experimental molecular mass should have been higher. Thus, it explains why our experimental molecular mass is too high.